Site 102 Labor In Vain Creek

Overview: Labor in Vain Creek supports a large salt marsh complex which lies between Labor in Vain Road to the north and Argilla Road to the south in the Town of Ipswich. The site encompasses approximately 408 acres of primarily salt marsh upstream of the existing bridge crossing over Labor in Vain Creek. A small portion of the marsh in the southwest corner extends south of Argilla Road via a 3 ft-wide stone culvert. This portion of the marsh receives substantial runoff from adjacent agricultural fields. The Creek joins the Ipswich River approximately 900 ft north of the crossing. The bridge was reconstructed in 1996 and consists of three spans with a combined length of 156 ft. Labor in Vain Road is an early town road and shown on the 1893 USGS 15 Minute Series Salem, MA Quadrangle map. There are three additional small culvert crossings along a private road (Fox Creek Road) further south and east of the bridge crossing. Two are unnamed creeks extending from the Ipswich River. The third culvert conveys the upper reach of Treadwell Island Creek into the northeast corner of the site. All three culverts are 24 in RCP pipes.

Tide gauge data collected in late April and again in late August 2005 documented a maximum restriction of approximately 0.5 feet during unusually high tidal events. During more typical spring tide events the restriction was minor. Although the restriction was only documented during unusually high tides, the narrowing of the channel at the crossing influences flow patterns and velocities. Eddies in the creek appear to be causing an increase in the amount of bank sloughing near the crossing. No subsidence of the high marsh plain was observed upstream of the crossing. Populations of *Phragmites* were observed fringing the upland sections both up and downstream of the crossing. *Phragmites*, loosestrife and *Iva* were more common within the upper reaches of the marsh. There is also a decrease in the typical dimensions of the creek upstream of Labor in Vain Road. The approximate width of the channel is 215 and 150 ft upstream and downstream, respectively.

Nearly half of the salt marsh is held in conservation by a combination of TTOR, ECGA lands and several privately held conservation parcels. The remaining area is privately held without land protection. The Labor in Vain Road right-of-way is municipally owned.

Structure conditions: The Labor in Vain Creek Bridge was constructed in 1996. Labor in Vain Road was resurfaced in the vicinity of the crossing and is generally in good condition. However, over wash during spring storms caused some erosion of the roadbed on the south side of the road, east of the crossing. Bridge plans on file with MassHighway District 4 were reviewed. The bridge structure consists of three spans with a combined length of 156 ft. The main (center) span is approximately 60 ft in length and is a cast-in-place concrete deck on steel beams. The two outer spans are approximately 48 ft in length and are cast-in-place concrete decks on concrete boxbeams. The main span and outer spans are supported by pier caps on top of concrete piles driven to bedrock. Cut stone and rubble is located under the outer spans and a cut stone façade was constructed around the two piers in the creek. The effective opening between the two piers is approximately 45 feet. The width of the structure is approximately 28 ft consisting of two travel lanes and narrow shoulders. The span includes three-beam bridge rail. Overall, the bridge deck, beams, and piers are in good condition.

Ecological Integrity: The site generally has a high level of ecological integrity. Nearly half of the marsh and is held in conservation by a combination of TTOR, ECGA and several privately held conservation parcels. The site is contained within the Parker River/Essex Bay ACEC and BioMap Core Habitat. The surrounding forest lands are mapped as Supporting Natural Landscape. Land uses are low density residential, undeveloped forest lands and agricultural fields south of Argilla

Road. The upper reaches of the wetland system include a small portion of freshwater marsh/wet meadow. These areas, especially within the portion of the marsh which extends south of Argilla Road, include several invasive species including purple loosestrife and *Phragmites*. There are also a number of modest-sized *Phragmites* stands fringing uplands throughout the marsh system. These stands will likely expand without control measures. *Iva* is commonly found along slightly elevated ridges along the edges of mosquito ditching, especially within the upper reaches of the marsh. The slightly elevated areas along the ditches were likely the result of plows used in the 1950's which simply side cast material adjacent to the ditch. Overall, the ditches appear to be generally well maintained and the site supported a relatively high portion of high marsh with few salt pannes. A few relatively large pannes within the easterly portion of the site provide important habitat diversity.

There were a number of locations within the main creek which are experiencing substantial bank sloughing. However, the phenomenon did not appear to be related to any observed ecological impairments such as unusually saturated peat conditions. There were several distinct scour pools within the interior creek system caused by obstructions within the base of the channel. These were the likely location of former farming roads used to access the larger upland islands within the marsh system.

The Mosquito Management District has preformed extensive maintenance of ditches along with limited OWMM on Trustees property within the marsh (W. Montgomery, Superintendent, NE MA MWMD). Aerial spraying is done during periods of peak breeding.

The existing bridge structure does not restrict upstream fish passage. Both Labor in Vain Creek and the Ipswich River are mapped as suitable habitat for soft-shelled clam beds.

There were two deployments of tide gauges to Labor in Vain Creek: one from April 19 to May 2 and the other from August 11 to September 9, 2005. At each deployment, two tide gauges were installed: one upstream and one downstream of the Labor in Vain Road bridge. Results of the April/May deployment show a small restriction at the bridge which becomes more pronounced at the higher tides above 6 ft, which occurred on 10 of the 25 tidal cycles recorded. Tidal restrictions ranged from less than 0.1 ft to 0.42 ft and delays ranged from less than 10 minutes to 27 minutes. The highest tide during the deployment period was recorded on April 28 at 3:04 AM. The NVGD adjusted height downstream of the bridge was 7.58 ft. The upstream adjusted height was 7.16 ft and occurred at 3:31 AM. The restriction caused a tidal dampening of 0.42 ft upstream of the bridge and a delay of 27 minutes. The dampening amounted to approximately 4.3% of the total tidal prism recorded at the downstream gauge.

Results of the August/September deployment show a similar restriction at the bridge which becomes more pronounced at the higher tides above 6 ft., which occurred on 13 of the 52 tidal cycles recorded. Tidal restrictions varied from 0.1 to 0.51 ft. and delays ranged from less than 10 minutes to 23 minutes. The highest tide during the deployment period was on August 21 at 1:10 AM. The NVGD adjusted height of the water downstream of the bridge was 7.51 ft. The upstream adjusted height was 7 ft which occurred at 1:33 AM. The restriction caused a tidal dampening of 0.51 ft upstream of the bridge and a delay of 23 minutes. The dampening amounted to approximately 4.9% of the total tidal prism recorded at the downstream gauge.

Relatively low salinities of 2.3 and 2.2 ppt (downstream and upstream, respectively) were recorded on a near slack, ebbing tide. These values are indicative of significant freshwater contributions to marsh system, especially during spring conditions.

The overall severity of the existing impairments is considered moderate. Increasing the effective opening under the bridge by removing fill between the center piers and abutments would likely reduce the observed bank erosion near the crossing and help to alleviate the restriction in flow experienced during spring tide conditions. Further study is necessary to assess the benefits of replacing secondary culverts within the system. Expansion of fringing populations of *Phragmites* and other brackish marsh vegetation would be expected without measures to address the tidal restriction.

Socioeconomic: Recreational values of the site are enhanced by public access and wildlife viewing opportunities within the TTOR holding off Argilla Road. The conservation status of a good portion of the site and public access enhances educational opportunities. However, there is no known ongoing research or nearby schools. The site's Uniqueness/Heritage value is enhanced by its inclusion within the Parker River/Essex Bay ACEC. The site does not include any known cultural resource elements or urban setting values.

Construction Logistics/Feasibility: The overall constructability for this site is medium. Increasing the hydraulic capacity through the bridge structure would involve removing most of the cut stone and fill between the bridge abutments and piers. With adequate scour protection to both the central piers and abutments, a portion the stone between can be removed without adversely impacting the structural integrity of the bridge. The removal of fill under the outer spans will be selective excavation which, in general, is a costly operation. The work would involve the placement of construction equipment within the creek channel and therefore require large cofferdam structures. There is likely value to the stone which would be removed avoiding deposal costs of the material. There is limited room near the bridge for construction staging; however the project should only require a small staging area. One-way traffic can be maintained during construction. There are no known underground utilities. Overhead electrical lines would likely interfere with the installation of cofferdam sheet piles. Construction costs are estimated to be in the range of $300,000. Much of the construction cost is related to the installation of coffer dams along both approaches to facilitate work in the dry. Local support for this restoration effort is unknown.

Restoration Potential: The site has several positive elements which increase its restoration potential rating including the presence of several important socioeconomic factors (e.g., a high recreational value and conservation status), lack of low-lying abutters and high level of ecological integrity. However, the site is considered to have low overall restoration potential related to possible improvements to the existing bridge crossing. Though increasing the hydraulic capacity of the bridge structure is possible without impacting its structural integrity, the costs of this construction effort is substantial. Increasing the effective opening under the bridge by removing fill between the center piers and abutments would likely reduce the observed bank erosion near the crossing by reducing velocities and eddies. The overall restoration potential, including other options discussed below, is considered moderate.

It would also be prudent to address each of the stands of invasive species on an individual basis with improved drainage, perimeter ditching, or limited excavation. Further studies at this site should focus on small scale marsh improvements which could help control the advance of fringing populations of invasives, as well as, additional tidal surveys at the culverts under Argilla Road and Fox Creek Roads. This data is necessary to better understand the potential benefits derived from improvements to the several small culvert crossings on the private roads east of the bridge crossing. Selective improvements at these crossings may have higher restoration potential but require further study. The presence of scour pools upstream and downstream of the Argilla Road crossing, as well as a greater prevalence of invasive species south of the crossing, suggest a

restriction may exist at this location. This work could improve tidal exchange within the southern limits of the marsh but not increase flow within the greater marsh. Improvements at the culvert conveying Treadwell Island Creek under Fox Creek Road appears to offer the best potential among the three smaller culvert crossings. The primary direction of flow under the culvert closest to the Labor in Vain bridge is to the north during an incoming tide. The middle crossing is located at the upper reaches of a small creek extending from the Ipswich River. The creek does not continue south of Fox Run Road. Providing a better hydraulic connection to existing ditching south of the road may result in modest benefits within this portion of the marsh.

Site # 102 | Site Features | Scale: 1:2,500

Photo 1 - Healthy High Marsh Downstream of Restoration Area

Photo 2 - Downstream View of Bridge Crossing

Photo 3 - Road Damage East of Bridge Approach

Photo 4 - Marsh Downstream of Crossing

Photo 5 - Marsh Downstream of Crossing

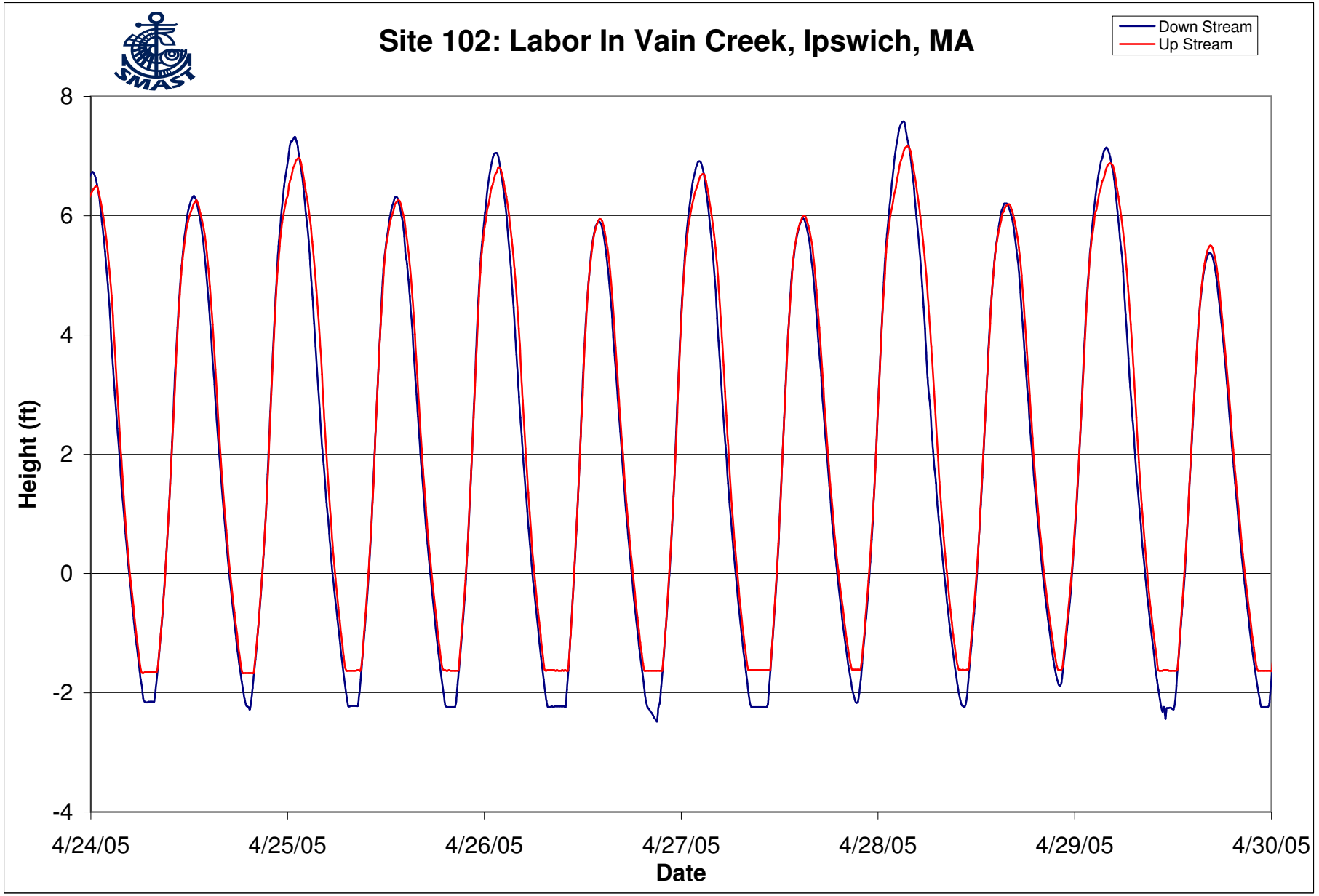
Photo 6 - Southern Portion of Site Viewing North

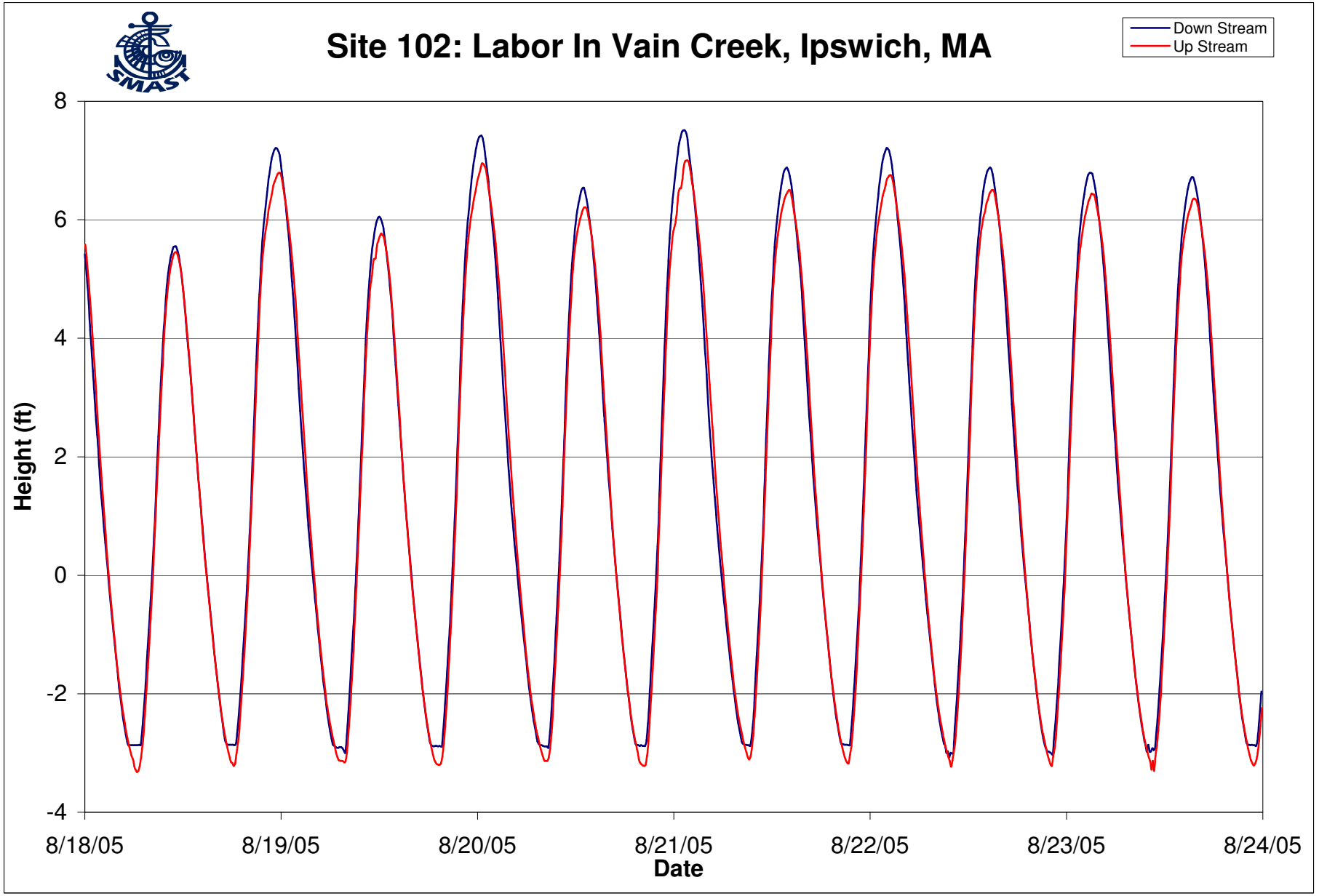
Photo 7 - Upstream View of Stone Box Culvert Under Argilla Road

Photo 8 - Upstream View of Western Fox Creek Road Crossing

Photo 9 - Upstream View of Middle Fox Creek Road Crossing

Photo 10 - Upstream View of Eastern Fox Creek Road Crossing


Site 102: Labor In Vain Creek, Ipswich, MA
Down Stream
Up Stream
8
6
4
2
0
-2
-4
Height (ft)
4/24/05
4/25/05
4/26/05
4/27/05
4/28/05
4/29/05
4/30/05
Date


Site 102: Labor In Vain Creek, Ipswich, MA
Down Stream
Up Stream
Height (ft)
8
6
4
2
0
-2
-4
8/18/05
8/19/05
8/20/05
8/21/05
8/22/05
8/23/05
8/24/05
Date

Great Marsh Coastal Wetlands Restoration Planning
Rapid Field Assessment

Site # 102
Labor In Vain Creek

Site Information

Site ID:	102
Site Name:	Labor In Vain Creek
Municipality	Ipswich
Location:	Labor In Vain Road crossing over creek to Argilla Road to the east
Adjacent Waterbody:	Ispwich River

Affected Area (Acres)

Mudflat/Open Water:	13.8	Total Area:	407.3
Salt Marsh:	388.9		
Other Wetland:	4.6	*Other Description:*	
Other:	0		

Impairment(s)

Tidal Restriction	☑	Fill	☐
Obstructed Ditche(s)	☐	Invasive Species	☑
Impoundment	☐	Pollution / Siltation	☐

Severity of Impairments: Minimal

Project Type

Roadway Culvert(s)	☐	Obstructed Ditches	☐
Bridge	☑	Fill	☐
Berm	☐	Other	

Evidence of Restriction

Gauge Data	☑	Impounded Flow	☐
Downstream Scour Pool	☑	Obstructed Flow	☐
Upstream Scour Pool	☐	Invasive Species	☑
Bank Erosion	☑	Ponded Conditions	☐
Slumping	☑	Subsidence	☐

Structure / Channel:

Overall Condition:	Good
Life Expectancy (Years):	50
Road Condition:	Good
Structure Type:	Concrete/steel beam brid
Structure Age (Years)	9
Structure 1 Width (Feet):	156
Structure 1 Length (Feet):	
Structure 2 Width (Feet):	
Structure 2 Length (Feet):	
Skew (Degrees):	0
Cover (Feet):	
Scour Protectection:	☑
Adequately Aligned:	☑
Headwall Type:	Cut Stone
Headwalll Condition:	Good

Ecological Integrity / Habitat Value

Surrounding Land Use %

Commercial / Industrial	0
Residential	20
Agricultural	30
Undeveloped	50

Severity of Impairment(s)	Moderate
Invasive Plant Cover:	Low
Extent of Wooded Buffer:	Fair
Habitat Connectivity:	Fair
NHESP Estimated Habitats of Rare Wildlife:	☐
NHESP Priority Habitats of Rare Species:	☐
NHESP BioMap Core Habitat:	☑
NHESP BioMap Supporting Natural Landscape:	☑
ACEC:	☑
Anadromous Fish:	☐
Shellfishing Suitability:	☑
Barriers to Fish Passage	None

Great Marsh Coastal Wetlands Restoration Planning
Rapid Field Assessment

Site # 102
Labor In Vain Creek

Construction Logistics / Feasibility

Traffic Volume	Low
Detour Potential	☐
Site Access	Good
Staging Areas	☑
Fill Material Concern	Minimal
Low Lying Property Concerns	Minimal
Overhead Utility Constraint	Moderate

Underground Utilities

Water	☐	*Telephone*	☐
Gas	☐	*Sewer*	☐
Electric	☐	*Drainage*	☐

Permitting Complexity	Medium
Local Support	Unknown
Feasibility Cost	20,000
Design Cost	30,000
Permitting Cost	25,000
Construction Cost	300,000
Total Cost	375,000
Relative Cost/Acre	1,000

Socioeconomic

Recreation

Public Access:	☑
Watercraft / Portage:	☑
Wildlife Viewing:	☑

Education

Schools Nearby:	☐
Ongoing Research:	☐
Education / Outreach Potential:	Medium
Saftey Concerns (Access):	Medium

Uniqueness / Heritage Value

Rare Species Habitat:	☐
ACEC:	☑
Cultural Resource Features	☐
Urban Viewscape Value:	None
Urban Habitat Value:	None

Tide Surveys

	Start:		*Finish:*
Dates of 1st Survey:	4/19/2005	-	5/2/2005
Date of Highest Tide:	4/28/2005		
Max Measured Tidal Dampening:	0.42		
Percent of Tidal Prism:	4		
Measured Delay:	27 min		

	Start:		*Finish:*
Dates of 2nd Survey:	8/11/2005	-	9/9/2005
Date of Highest Tide:	8/21/2005		
Max Measured Tidal Dampening:	0.51		
Percent of Tidal Prism:	5		
Measured Delay:	23 min		

Summary

Uniqueness / Heritage Value:	Low	Ecological Integrity:	High
Recreational Value:	Medium	Logistics / Feasibility:	Medium
Educational Value:	Medium		

Restoration Potential: Moderate